Implementing an On-Site Sodium Hypochlorite Generation System (OSHGS) in an Existing Chlorine Gas Footprint

Jason King, E.I.T.

May 9th, 2014

131 SW 5th Avenue, Suite A
Meridian, Idaho 83642
(208) 288-1992

KELLER associates

Outline

- Process
- System Components
- System Safety
- Wastewater System Uses
- Water System Uses
- Case Study – Water Treatment
- Advantages of Sodium Hypochlorite Generation

Process

- Uses salt, water, electricity

- Produces 0.8% sodium hypochlorite and hydrogen gas

System Components

- Brine tank
- Brine pump
- Sodium hypochlorite generation skid
- Sodium hypochlorite storage tank
- Hypochlorite metering pump
- Hydrogen dilution blower
- Dilution panel
- Heat exchanger

Brine Tank

- Salt/Water
- Brine pump

Sodium Hypochlorite Generation Skid

- Uses salt/water brine
- Produces sodium hypochlorite for treatment

Hypochlorite Storage Tanks

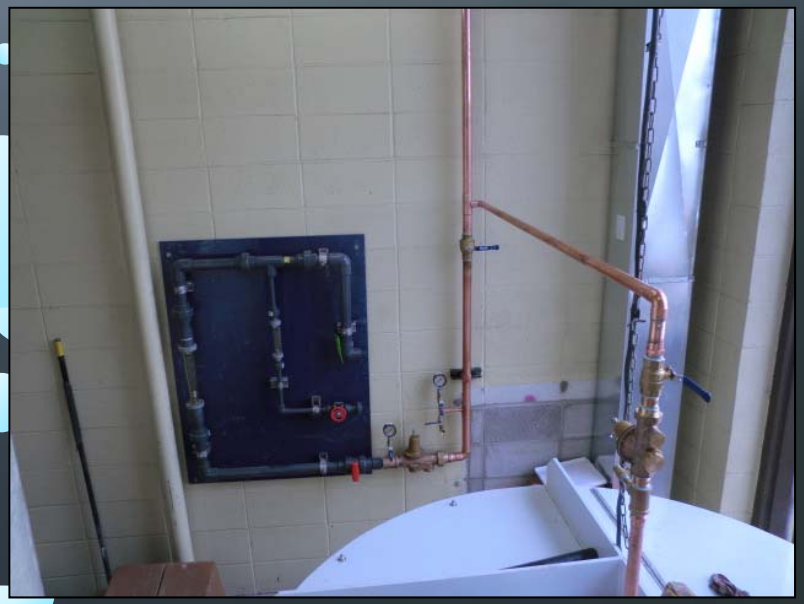
- Sodium hypochlorite will begin to degrade after 30 days

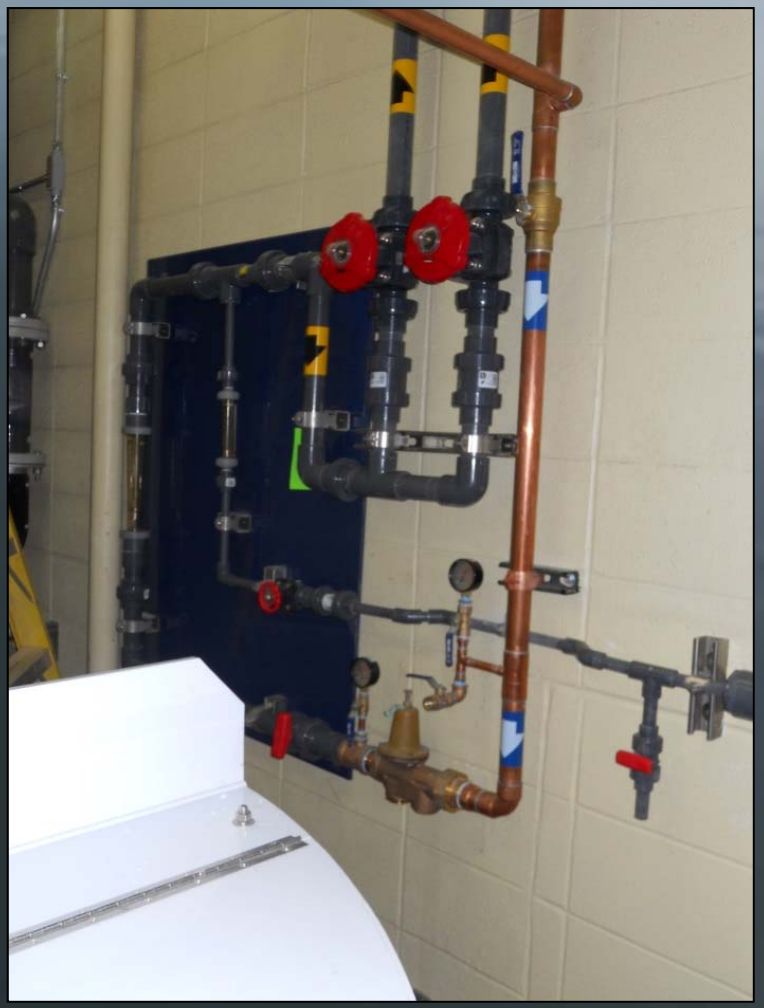
Dilution Blowers

- Prevent hydrogen gas buildup
- Designed to pull air from outside

Dilution Panel

- Needed in case generation system fails





Other Considerations

- Store 30 days of sodium hypochlorite
- Water temp greater than 60ºF helps with scaling issues
- Water pressure must exceed 40 psig
- Brine tank should be cleaned every 6 months
- System can be cleaned or repaired without being taken out of service
- Exposure to UV-light accelerates degradation of hypochlorite

System Safety

- Limited exposure to hazardous chemicals
- Eliminates production of disinfection by products
- Disinfectant produced and stored in liquid form
- No risk of gas leaks
- No EPA required Risk Management Plan
- No HAZMAT training required

Wastewater System Uses

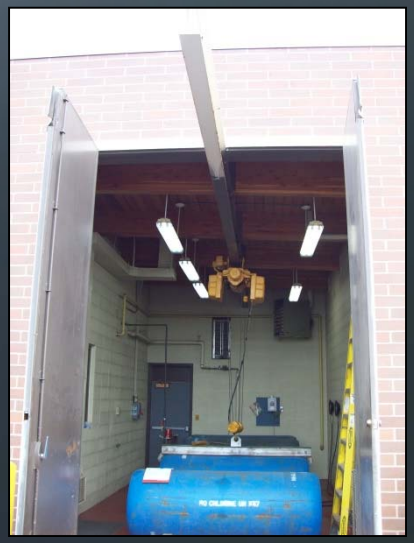
- Effluent treatment
- Kills filamentous

Water System Uses

- Water treatment
- Chlorine residual

Case Study – Retrofit to Gas Treatment at Water Plant

- City of Lewiston, ID Water Treatment Plant
- Existing chlorine gas system
- Conversion to an OSHGS
- Treated flow (2 to 17.5 MGD)

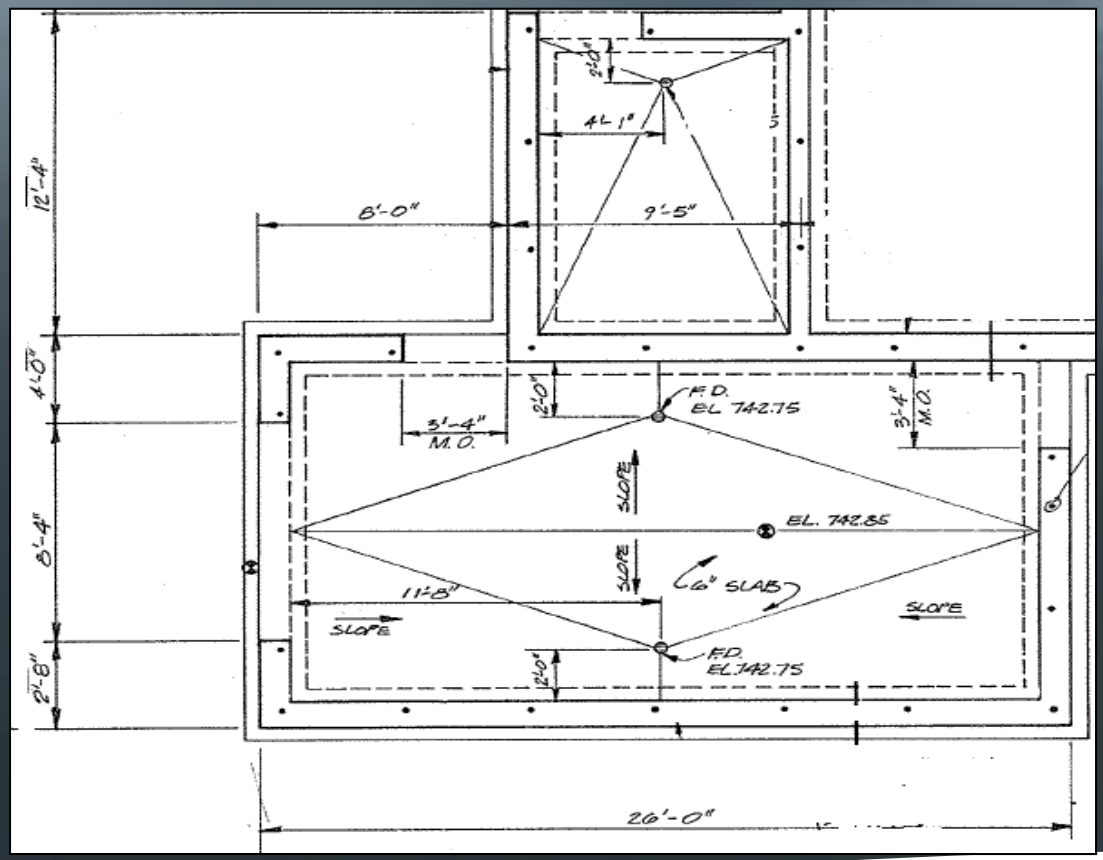


Design Challenges

- Reuse of existing building
  - Spatial constraints
- Existing gas chlorination could not keep up with peak summer demands
  - Tight construction schedule
- Reuse of existing components
  - Budgetary constraints
- Flexibility of brine salt purchasing

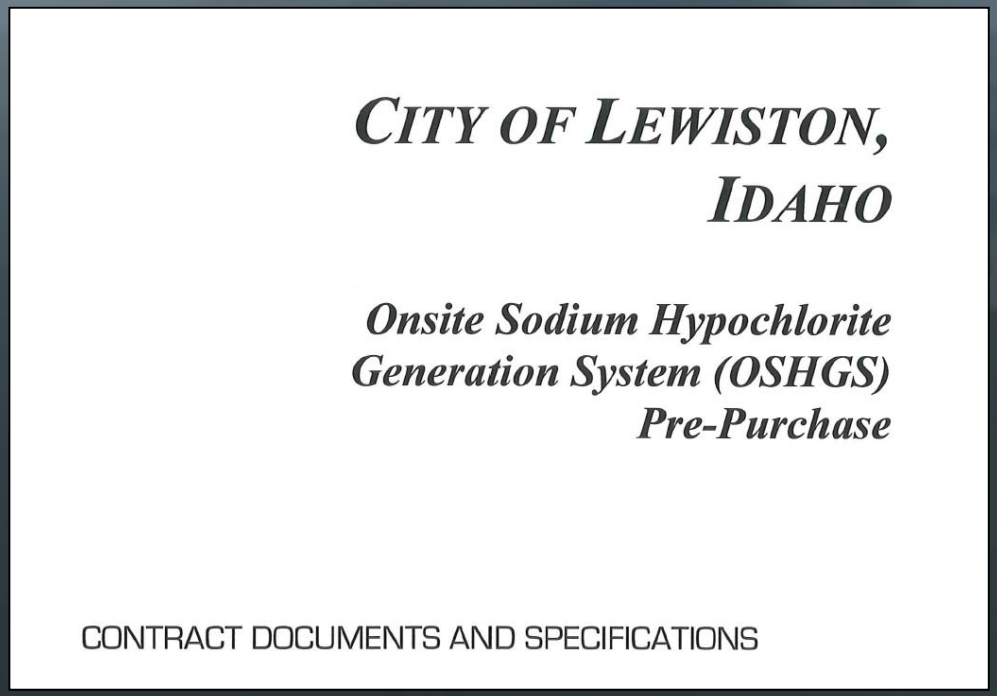
Optimizing Design with Limited Space

- A larger footprint would be ideal



Pre-Purchasing Equipment

- Optimizing construction schedule
- Reduces risk of change orders

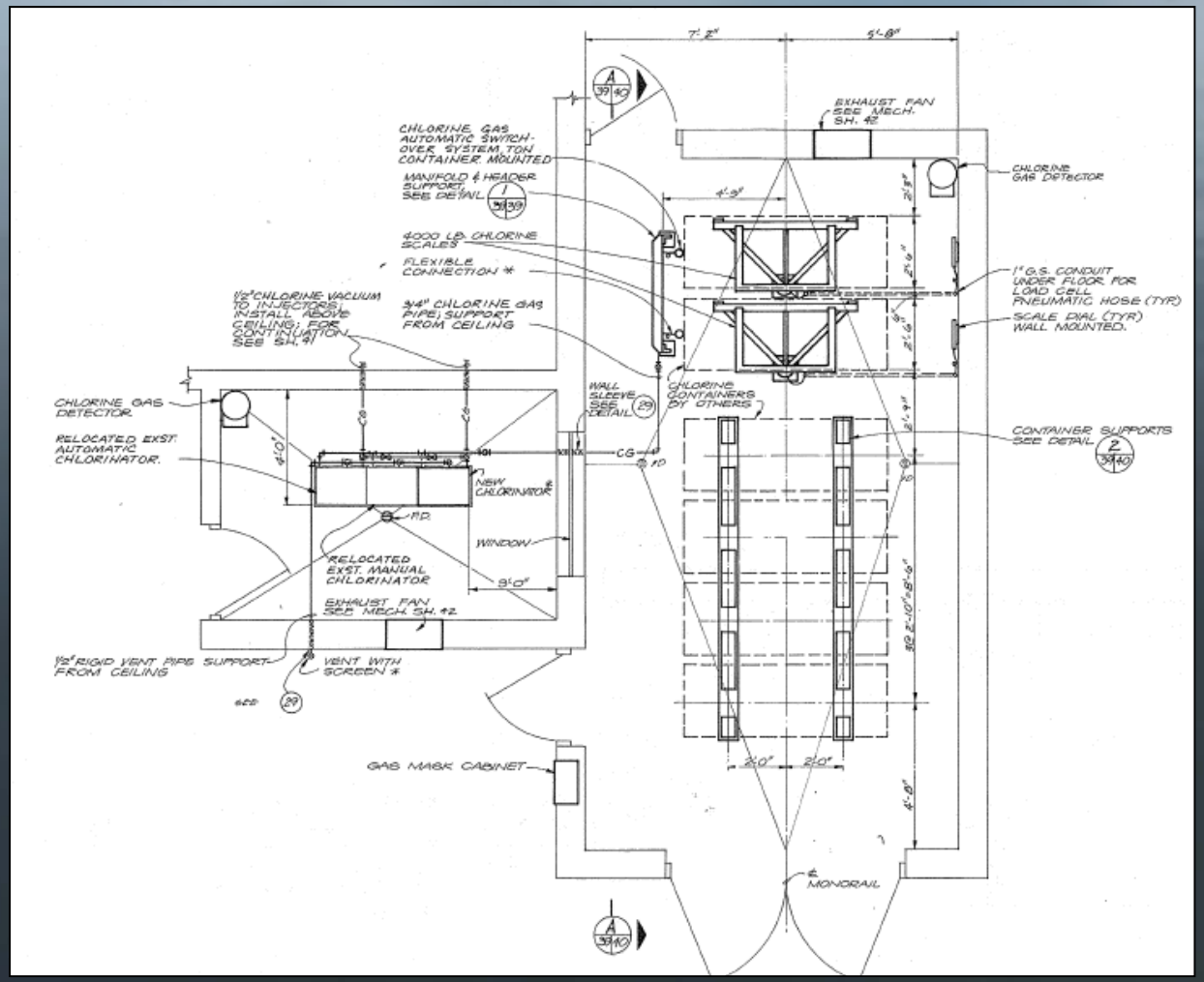


CITY OF LEWISTON, IDAHO

Onsite Sodium Hypochlorite Generation System (OSHGS) Pre-Purchase

CONTRACT DOCUMENTS AND SPECIFICATIONS

Existing Chlorine Gas Layout

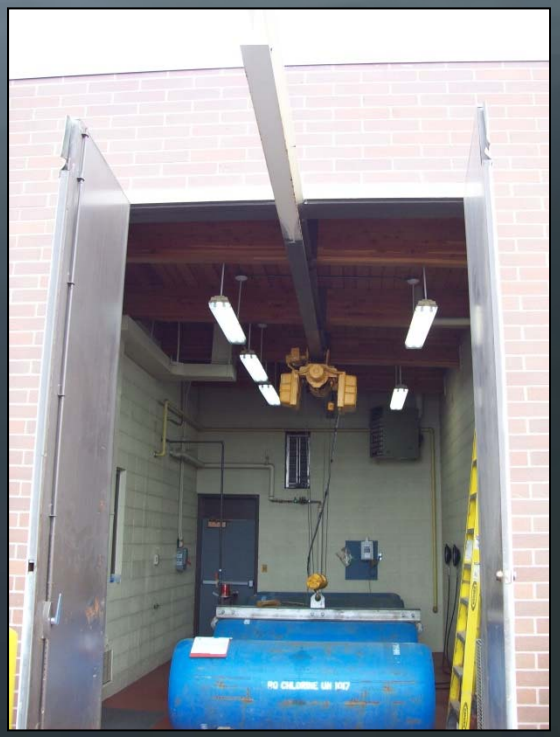


Reuse of Existing Components

- Bridge crane
- Chlorine piping/diffusers
- Slab modifications
- Removal of interior wall

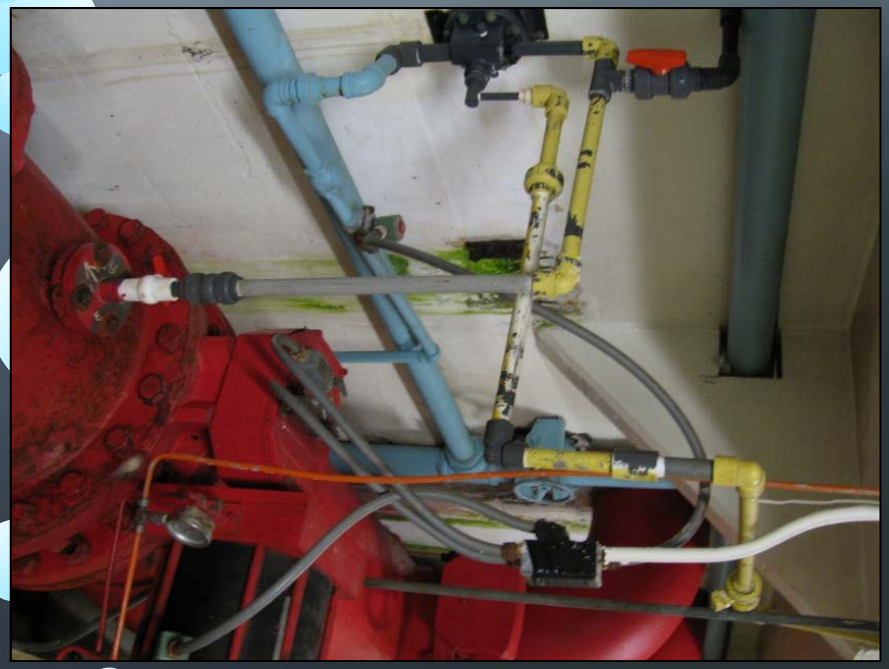
Bridge Crane

- Placement of brine tank
- Structure evaluation



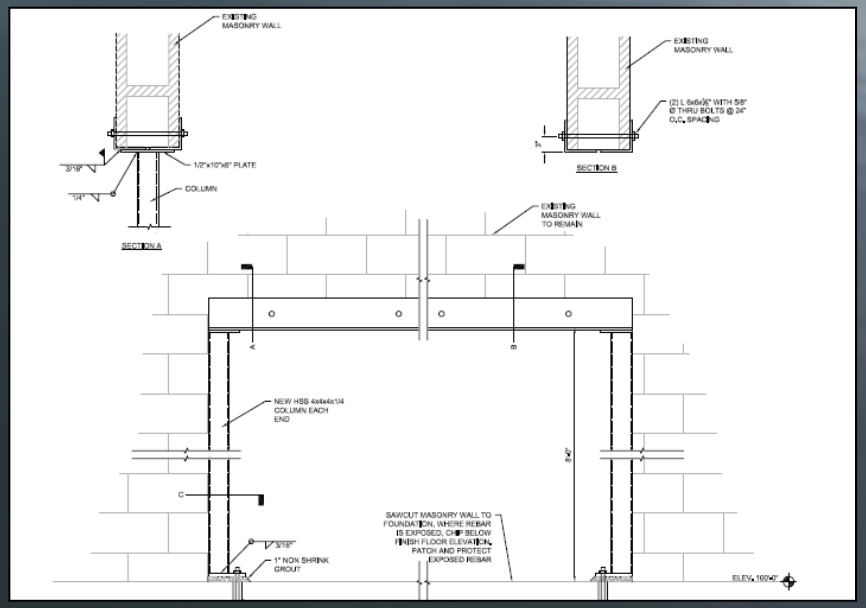
Reuse of piping

- Pump sizing
- Pipe retention time



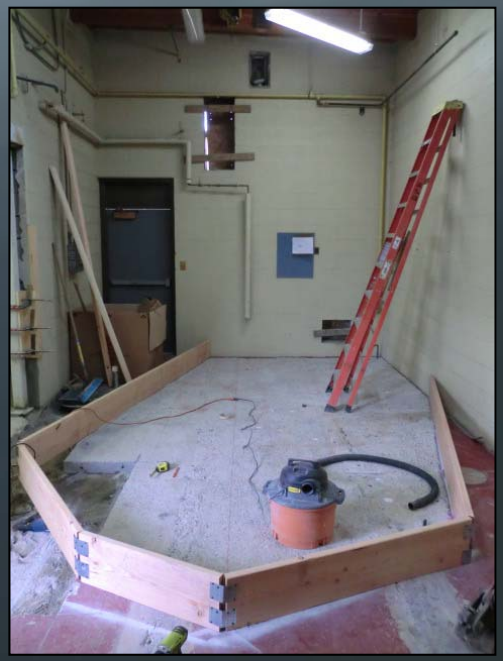
Interior Wall Modifications

- Sized to moved generation equipment
- CMU reinforcement columns



Modifications to Slab

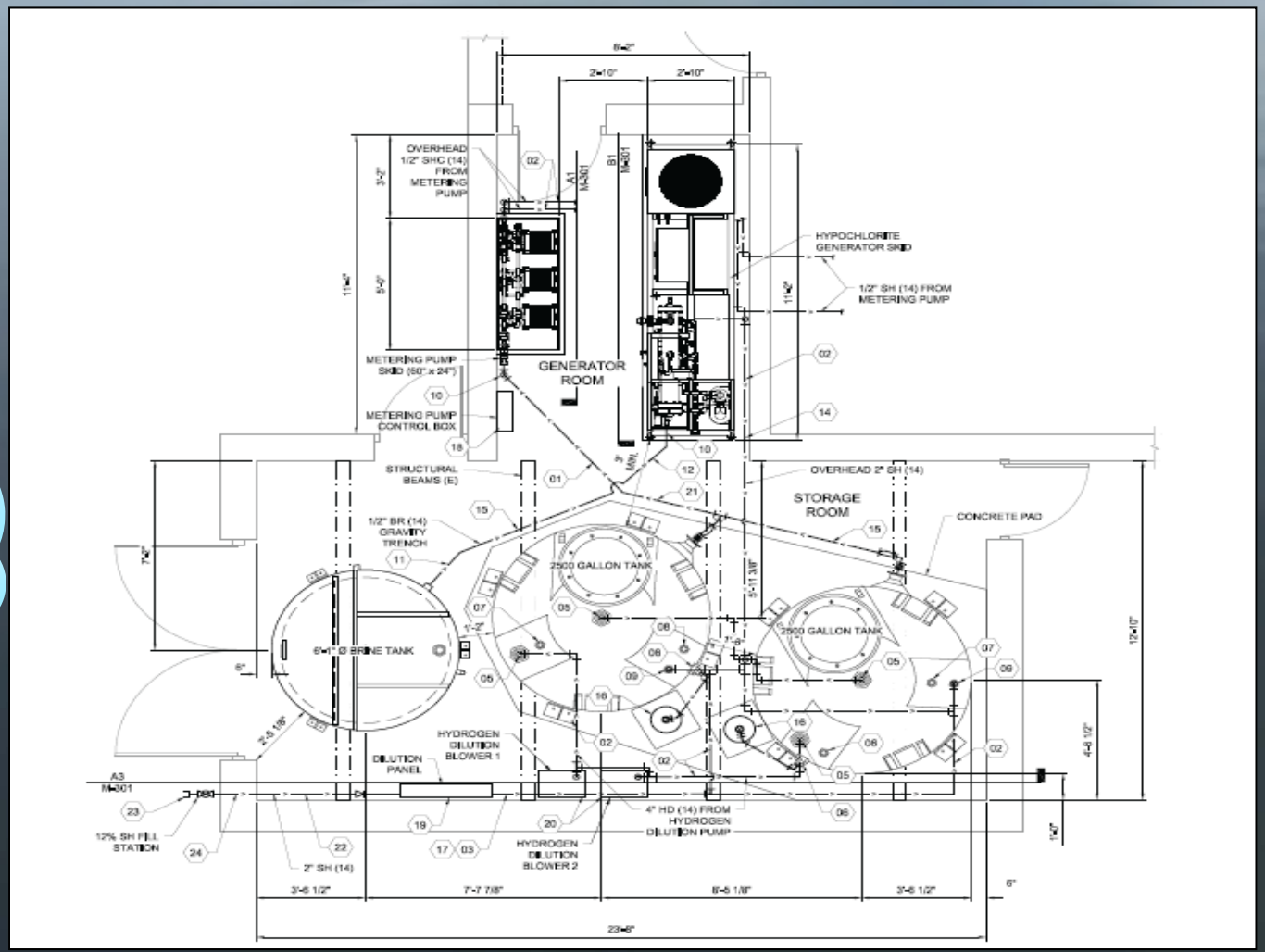
- Seismic calculations
- Reuse of existing slab



Brine Salt Flexibility

- 40-50 lb bags
- 1 ton totes
- Supplier delivered (Truck, Blown in)

Sodium Hypochlorite Layout



Project Overview

Advantages of On-site Sodium Hypochlorite Generation

- Safety
- Improved water quality
- Independence
- pH suppression from treatment reduced
- Consistent concentrations
- Reduces carbon footprint
- Delivery Costs
- Reduced operational costs

Questions

Jason King, EIT

KELLER associates